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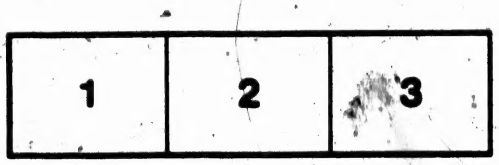

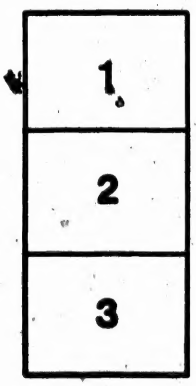

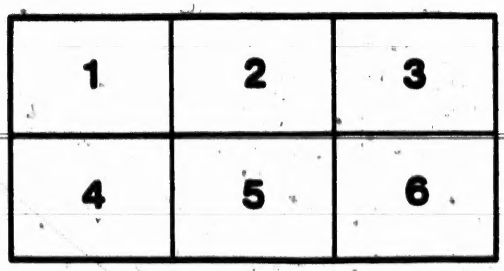

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PROGRAMME

AND

EXAMINATION QUESTIONS

FOR

ADMISSION TO STUDY AND PRACTICE

OF

SURVEYING

IN THE

PROVINCE OF QUEBEC.

BOARD OF SURVEYORS

OF THE

PROVINCE OF QUEBEC.

Montreal:
GAZETTE PRINTING COMPANY.
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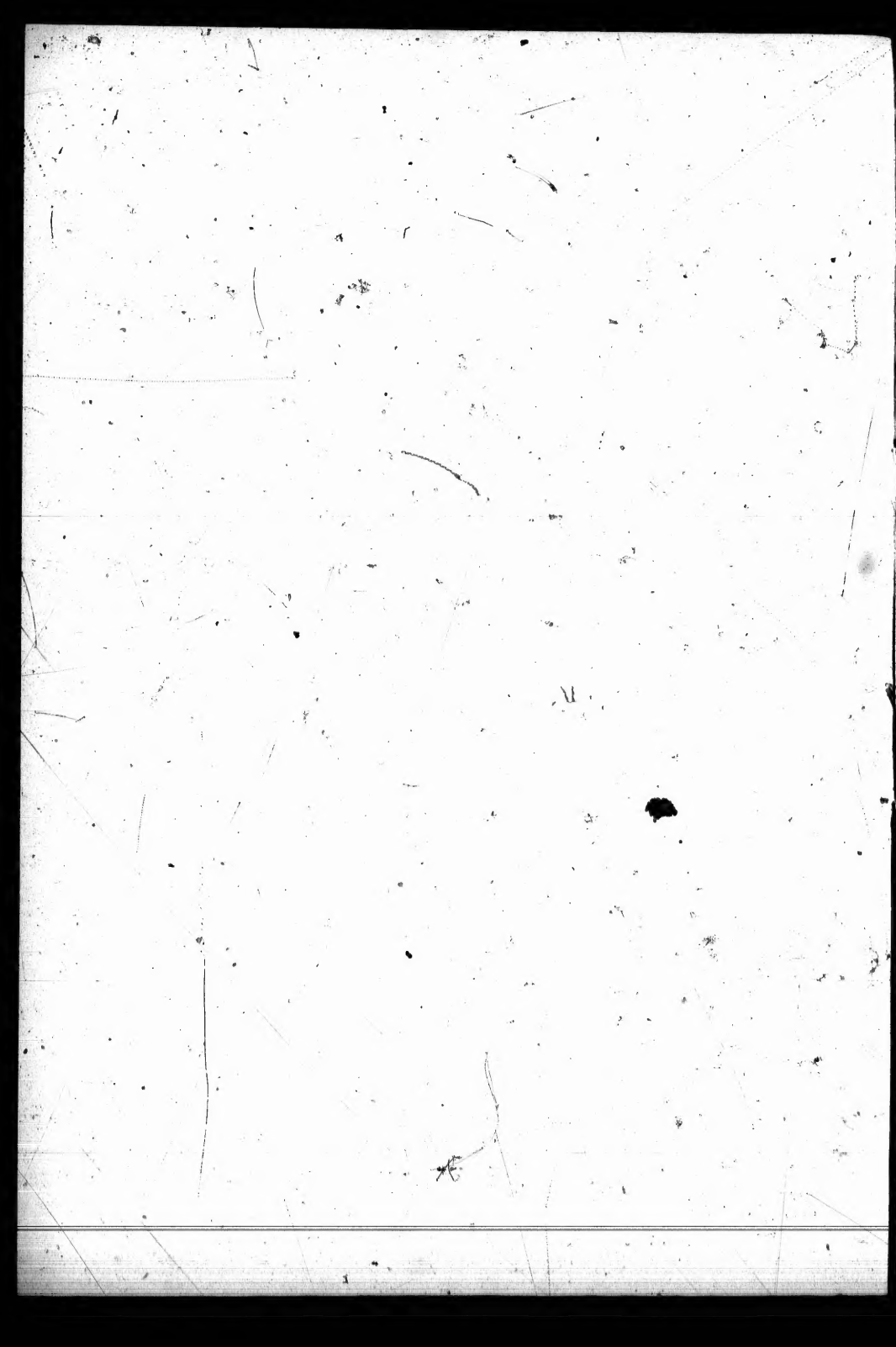


QUEBEC, July, 1883.

To the Board of Management of Land Surveyors and to the Land Surveyors of the Province of Quebec.

GENTLEMEN:

We have again the pleasure of sending you printed copies of the questions submitted by us at our July examination to the candidates for the study and practice of Land Surveying.

We think that a comparison with our January examination questions will prove that it is not sufficient for the candidates to learn a certain number of questions in the hope that they may be able to pass. But that they must come fully prepared in all the subjects required by law. Our theoretical papers are still too elementary for the admission to practice and are yet as difficult as the present condition of things will admit of, but we hope to be able to shew a semi-annual improvement.

At this examination seven candidates presented themselves for practice of which one only was found qualified. And two for study, both of which were rejected by the Board.

Annexed to this report you will find the Secretary's report and extract from the minutes which may prove of interest to members of the profession who were not present at our meeting.

We have the honor to be,

Gentlemen,

Yours obediently,

WM. McLEA WALBANK,
D. C. MORENCY,
F. N. GASTONGUAY,
} *Committee of Examiners.*

REPORT OF THE SECRETARY-TREASURER.

JULY SESSION, 1883.

The Secretary-Treasurer to the Board of Management, at the close of the fiscal year, 1882-3, has the honor to report.

The moneys received have been deposited in the Caisse d'Economie, and payments have been made by cheques on the Bank, as recommended by the Board.

The Syndic has been supplied with a list of all the surveyors who have paid the annual contribution up to date, so as to enable him to call on those who have not yet paid, to pay without delay, and save the expense of legal process. It must be borne in mind that the first years' expenses of the Board will certainly be greater than in the following years, from the unavoidable outlay attendant on its inauguration and establishment. And further, if all the surveyors contribute the amount payable by each will be less than when, as now, the expenses are borne by only a part.

Your Secretary has to report that Mr. Gerald George Dunlevie, availing himself of the provisions of the Act. 46, Vic. c. XXXV., has signified by letter his withdrawal from the profession of land surveying in this province.

Your Secretary begs also to report that he has applied to the Secretary of the Province for a set of the Quebec Statutes, and for the regular reception of the *Official Gazette*, and to the Board of Works for a double door; and that these requests have been granted. He is also in hopes of obtaining from the Geological Survey office their reports of exploration.

The cash-book shows a balance on hand of $105.83.

Respectfully submitted.

E. T. FLETCHER,
Secretary-Treasurer.

QUEBEC, 2nd July, 1883.

PROGRAMME OF SUBJECTS FOR EXAMINATION FOR STUDY AND PRACTICE OF LAND SURVEYING.

STUDY.

Matters.	Authors recommended.
Canadian history	Miles—Laverdière.
Geography	Lovell's larger—Holmes.
Dictation	
French and English translation	
Arithmetic	Christian Brothers.
Algebra, including Quadratic Equations	(Loomis Edition).
Geometry, Books 1, 2, 3, 4 and 6 as in Chamber's or Todhunter, or Books 1, 2, 3 and 4, as in Legendre.	
Nature and use of logarithms	

PRACTICE.

In addition to the foregoing, the candidates for practice must be prepared to answer qustions given in the following subjects.

Mensuration of solids and surfaces	Baillargé or Chambers.
Plane Trigonometry, as far as and including the solution of oblique angled triangles...	Chambers—Davies' Legendre.
Spherical Trigonometry, as far as and including the solution of triangles	Chambers—Davies' Legendre.
Analytical Trigonometry to the extent of being able to deduce all plane and spherical formulæ for triangles	Galbraith and Houghton.
Practical Astronomy, as applied to the finding of time, latitude, azimuth, &c., with the ordinary surveying instruments	Loomis.
Linear Drawing and Topography	Gillespie.

The construction, use and adjustment of the Compass, Transit, Sextant, Theodolite, Level and Aneroid Barometer	Gillespie.
Laws of Surveys and prescription in the Province of Quebec.....	
Practical surveying, including the division of land, Levelling.....	Gillespie and Simms.
The candidate must come prepared with the sufficient instruments to make a survey in the field, plot his notes and prepare a finished plan of his work in ink	
Elements of Botany	Moyen.
Elements of Mineralogy and Geology.....	Laflamme

Percentage required, 70 p. c.

BOARD OF INCORPORATED SURVEYORS,

PROVINCE OF QUEBEC.

JULY SESSION, 1883.

[*Extracts from the Minutes.*]

Mr. Joseph William Tremblay, of Chicoutimi, having passed his examinations and complied with the requirements of the law, was admitted to practice, and having taken the oaths of allegiance and office received his diploma, as a provincial land surveyor.

The examination of Mr. François-Xavier Genest, of Quebec, terminated favorably; but his diploma was withheld until he should produce a satisfactory certificate of practice in the field.

Messrs. James Addie and J. N. Gastonguay, were appointed supernumerary examiners, to take the place of those absent.

Some inconvenience being apprehended from the 2nd paragraph of the 39th section of the Act 45 Vic., chap. 16, being so worded as to favor the opinion that it applied to Dominion Surveyors who had passed no examination as such, but held that status solely in virtue of having been Provincial Land Surveyor at the time of Confederation, Mr. Wm. McLea Walbank gave notice that he will move the following amendment, to be submitted to the Legislature:—That the word "appointed" in the said paragraph be struck out and replaced by the words "having passed the prescribed examination, and holding a diploma."

GEOGRAPHY.

STUDY.

1. What are the boundaries of the Dominion of Canada and into how many provinces is it divided?
2. What are the boundaries of the Province of Quebec and into how many counties is it divided?
3. Where is the seat of the Federal Government and that of the Province of Quebec?
4. Which is the principal river of Canada where does it take its source and where does it discharge its waters?
5. Which are the principal lakes in Canada and give their situations?
6. Which are the principal mountains in the Province of Quebec?
7. What are the boundaries of France and what is its capital?
8. What is the capital of Spain and name its principal cities?

HISTORY OF CANADA.

STUDY.

Answer with a few details of facts and dates to the following questions:

1. In what year did the Jesuits arrive in Canada and who were the first amongst them?
2. Who succeeded to Mr. de Courcelles?
3. What are the most remarkable facts from the time of the treaty of Utrecht till the death of Vaudreuil?
4. Describe the battle of Monongahela?
5. What is the most salient feature of the government of Lord Durham?

EUCLID.

STUDY AND PRACTICE.

Time allowed, 3 hours.

1. If a side of any triangle be produced, the exterior angle is equal to the two interior and opposite angles; and the three interior angles of every triangle are together equal to two right angles?
2. The greater side of every triangle has the greater angle opposite to it?

3. If a straight line be divided into any two parts, the square on the whole line is equal to the square on the two parts, together with twice the rectangle contained by the two parts?
4. The angles in the same segment of a circle are equal to one another?
5. In a given circle, to inscribe a triangle equiangular to a given triangle?
6. Equal triangles which have one angle of the one equal to one angle of the other, have their sides about the equal angles reciprocally proportional; and triangles which have one angle of the one equal to one angle of the other, and ther sides about the equal angles reciprocally proportional, are equal to one another?
7. To describe a rectilineal figure which shall be similar to one given rectilineal figure and equal to another given rectilineal figure?
8. Prove that straight lines which bisect the angles of a triangle meet at the same point.

SOLIDS AND SURFACES.

Study and Practice.

Time allowed, 3 hours.

1. Give a general formula for the solution of all questions relating to the area and solidity of all bodies if you know of any?
2. What is the surface of a sphere whose diameter is five inches?
3. If a segment whose slant side is=6 feet is cut off from the upper part of the cone whose slant side is 30 feet and the circumference of its base =10 feet, what is the convex surface of the frustrum and solidity of the cone?
4. What is the surface of a frustrum of a regular pentagonal pyramid, its lateral length being=5′.10″ and the sides of its ends being 10 and 15 inches?
5. What is the solidity of a spherical segment the radius of whose base is 25 inches and its height 6·75?
6. What is the area of an ellipse, whose axes are 12 and 16?

ARITHMETIC, ALGEBRA AND LOGARITHMS.

Study and Practice.

Time allowed, 3 hours.

1. Divide 73.64 by .43232.
2. Find the fourth proportional to $\frac{1}{4}$ $\frac{11}{15}$ $\frac{13}{24}$.
3. Simplify by Logarithms $\frac{10}{7+\frac{2}{3}-\frac{1}{4}} \times \frac{7.3.2.}{6.7.8.4.} \div (1\frac{3}{10} - \frac{17}{20})$.
4. Convert to a vulgar fraction in its lowest terms — .00426.
5. The receipts of a Railway Company are apportioned as follows:—Working expenses 48 per cent. of the whole receipts, 10 per cent. on $\frac{1}{4}$ of the capital set aside, balance of $32.000 divided among stockholders gives a dividend of 4%; find the capital and receipts.
6. Divide $A^3 - \frac{1}{25}$ by $A - \frac{1}{a}$.
7. Find the greatest common measure of $6(x+1)^4\ 9(x^4-1)$.
8. Solve the equation $\frac{1}{3}(8-x) + x - 1\frac{1}{3} = \frac{1}{4}(x+6) - \frac{x}{3}$
9. How many minutes does it want to four o'clock, if three-quarters of an hour ago it was twice as many minutes past two o'clock.
10. The side of a square is 110 inches long, find the length and breadth of a rectangle which shall have its perimeter four inches longer than that of a square, and its area four square inches less than that of the square?
11. Find the values of x and y.

$$\frac{x}{a} + \frac{y}{b} = c; \quad \frac{x}{b} - \frac{y}{a} = o.$$

12. What are logarithms? Prove that the logarithms of 1 is 0, and that the logarithms of the base is 1.

"PLANE TRIGONOMETRY."

Practice.

Time allowed, 3 hours.

1. Prove that:—Tan. $2A = \frac{2 \text{ Tan. } A.}{1 - \text{Tan. } ^2A.}$
2. Prove that:—Sin. $(A+B)$ Sin. $(A-B) =$ Sin. $^2A -$ Sin. ^2B.
3. At what distance on the earth's surface should two mountains, three (3) miles and two (2) miles respectively, be placed in order that the summit of each should be just visible from the summit of the other?
4. Find the area of a triangle whose sides, in gunters chain, are 0.23, 0.34, 0.45; answer to be in arpents and metres.

5. Given $b = 30.8$, $A = 62.73$, angle $A = 107° .03' 13''$ find angle opposite b and the side c.
6. Given $A = 1000$, $B = 120° 15' 15''$, $C = 36° 52'$ find angle A and side C.
7. The earth substends at the centre of the sun an angle of 17.2; what is the sun's distance from the earth?
8. Find the sine of $1''$.

"SPHERICAL TRIGONOMETRY."

PRACTICE.

Time allowed, 3 hours.

1. In a spherical triangle prove that:—Sine B: Sine C: : Sine b: Sine c.
2. The sum of three sides of a spherical triangle is less than the circumference of a great circle, and the three angles of a spherical triangle are together greater than two right angles, and less than six right angles.
3. Given $A = 70° 14' 20''$, $B = 49° 24' 10''$, $C = 38° 46' 10''$, find the angle A.
4. Given $A = 50° 45' 20''$, $b = 69° 12' 40''$, Angle $A = 44° 20' 10''$, find the side C.
5. Prove the fundamental formula of Spherical Trigonometry.

ASTRONOMY.

Time allowed, 3½ hours.

1. Convert 9 hs., 10 ms., 15 sec., on July 4th, into civil time; and what would be the astronomical time, corresponding to July 4th, 3 hs., 20 ms., 55 sec., A. M.?
2. What is the azimuth of a line or object. How would you deduce from an observation the astronomical azimuth of a line or object?
3. Suppose you were required to run an exploratory line, say 60 miles long on an azimuth of 285° in latitude north 45°. At the end of thirty miles you take astronomical observations to rectify your course—on what azimuth must you produce your line as a straight line?
4. At a place in north latitude the sun's declination being 6° 47″ 50. S. his time altitude was 30° 20′ at 8 hs. 46 m., A.M.; what was the latitude?
5. In the forenoon the true altitude of the sun's centre was found to be 33° 20′ its declination being 6° 47′ 50″, Latitude N. 24° 30′ what was the apparent time of observation and azimuth?

PRACTICAL SURVEYING, LEVELLING, &c.

1. What are the three principal methods used in instrumental surveys? which do you consider the most accurate and why?
2. How would you produce a parallel of latitude by laying out chords of a given length? Lay out by chords 500 chains long the parallel of N. 45° 0′ being given the logarithm convergence of one chain departure 9.81406.
3. Suppose you were called upon to settle a disputed boundary between two farms; detail your mode of procedure. How would you act in the case of a city lot?
4. Explain how you would proceed to cut off any portion from a field with curvelineal boundaries, and by a line from a point in its boundaries and by a line parallel to a given line?
5. There is a quadralateral field no two sides of which are parallel, it is required to divide it into three equavalent parts (a) How would you proceed if you were required to start from two fixed points?
6. Required the height of a fort standing on sloping ground 14° 10′ 0, being given a distance,
   A. B. = 124; D.B.F. = 58° 20′; D.A.E = 40° 3′?
7. I want to join two points A. & B, one mile apart by a straight line, and owing to its being bush land I am unable to see the two points at the same time. Illustrate your answer by an example. Supposing at the same time that it is necessary in order to pass buildings and lakes to make at least the following deflections from the straight line before reaching the desired point.

   A. C. = N. 30′ 20 E. distance of 5 chains.
   C. D. = N. 35 20 E. " of 2 "
   D. E. = N. 05 10 W. " " 2 "
   E. F. = N. 25 40 W. " " 6 "

8. Being given the angles $a\ b\ c = 71° 40′$; $b\ c\ d = 129° 15′$; the distance $b\ c = 950$ feet; what will be the radius of the easiest curve that can be traced for uniting a, b, to c, d, ?
9. What is meant by a level-line, explain the terms trial-levels, check-levels, contour-lines, grade-lines, datum lines, Bench-mark.
10. Plot from field-notes profile of line of road; are the notes correct; if so how do you prove them so?

Station.	Distance	Back Sight.	Inter-mediate.	Fore Sight.	Height of instrum't	Reduced Level.	Remarks.
						67.20	B. M. on Crib lower end marked in red chalk.
	00	1.27					
	50			10.08			
		1.30					
	75		0.57				
	100			6.06			On surface water lower end.
		10.18					
	150			3.61			
		7.82					
	175		2.35				
	200			0.14			
		10.58					
	210		7.21				
	300		3.58				
	350			0.88			
		13.68					
	400			0.47			
		11.86					
	450			0.64			
		8.65					
	500		12.50				Surface water on new Centre line.
	550	2.19		5.52			[March 3rd.
	600	1.36		10.19			
	650			12.81			

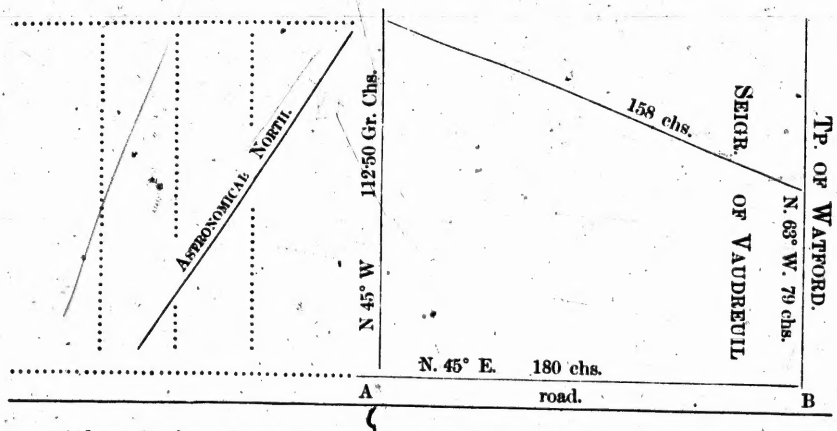
11. Give any point to be guarded in taking an important series of levels?
12. Draw an ellipse the diameters being 4 inches and $2\frac{1}{2}$ inches?
13. Define Prescription, possession, suppoena duces tecum.
14. Is the law of prescription universal or are there any exceptions? If so mention them.
15. How many years does it take to have prescription with title and without?
16. What is the measure of land in this province? In what cases does it not apply?

N.B.—In addition to the foregoing, the candidates spent one whole day in the field, and prepared finished plans of their work; and were examined orally on the Instruments.

SPECIAL PAPER FOR DOMINION LAND SURVEYORS.

1. By what law are prescriptions in respect to immovable property governed, and how many years does it take to prescribe?
2. What is the difference between prescription and possession?
3. Is the law of prescription universal; if you know of any excceptions enumerate them.

4. What rules are to be observed in preparing an official plan and book of of reference when it is necessary in sub-dividing a lot to deposit a plan and book of reference with the Commissioner of Crown Lands?
5. Suppose you were requested in your official capacity to establish a line between two farms presently separated by a ditch; explain what information you would require and your mode of procedure, and how would you mark the established points?
6. What is the standard measure in the Province of Quebec? When does this standard not apply?
7. Suppose you were called upon to establish the front and rear lines of a township; describe clearly in detail your mode of procedure from taking charge of the survey until its completion; 1st. if there are no posts or boundaries visible; 2nd. if you find what appears to have been a boundary post?
8. What rules govern a surveyor in surveying a township?
9. What is the difference between a seigniory and a township survey?



A has the lot above diagrammed. He sells to *B* 312 arpes, 57 perches, 219 ft. in area. How many acres has he left? The division line between the two lots having to be parallel to *A D*, at what distance from *A* on the line *A B* must it start to cut off the required area?

Make a process-verbal describing your operations.

Supposing your measurements have been made in English measure.

"MINERALOGY."

Time allowed, 1 *hour.*

1. What are Stalactites, Stalagmites?
2. What is Refraction—simple—double?

Give the distinctive characters of

Graphite,
Serpentine,
Granite.

Viva Voce examination on specimens.

"GEOLOGY."

Time allowed, 1 *hour.*

1. What is the origin of igneous rocks?
2. " " beds of peat?
3. " " continents?
4. What are the effects of erosion?
5. In how many epochs is Historical Geology divided? Name them

Viva voce examination on specimens.

"BOTANY."

Time allowed, 1 *hour.*

1. What are the principal parts of a perfectly organized plant?
2. What are the functions of the leaf?
3. What is the fruit and into how many parts is it divided?
4. What is meant by graft?
5. What is meant by plant—annual—bi-annual—perennial and hardy?

Viva voce examination on specimens.